

# DEPLOYING RED HAT CEPH STORAGE ON QCT SERVERS

TECHNOLOGY BRIEF



QCT offers a family of servers for different types of scale-out storage clusters, optimized with Red Hat Ceph Storage for different workloads and budgets.

Throughput-optimized configurations offer impressive performance with both standard and high-density servers.

Cost- or capacity-optimized configurations provide industry-leading density. Innovative QCT server platforms are easy to deploy rapidly at scale.

Extensive Red Hat and QCT testing reduces the risk out of deploying scale-out, Ceph-based storage solutions.

## INTRODUCTION

As storage needs increase, enterprises are seeking to emulate the efficiency achieved by public cloud providers with software-defined cloud datacenter models, based on standard servers and open-source software. In addition, storage is undergoing a fundamental structural shift. Organizations are returning to server-based storage after decades of network-attached storage (NAS) and storage area network (SAN) growth<sup>1</sup>. Software-defined, scale-out storage has emerged as a viable alternative, uniting standard servers and independent software for data access and highly available services across the enterprise.

The combination of QCT (Quanta Cloud Technology) servers and Red Hat® Storage addresses enterprise needs and storage industry trends. Together, QCT servers and Red Hat Ceph Storage—both already integral to many public cloud datacenters—provide software-defined storage solutions for both private and public clouds, accelerating the transition from costly proprietary storage solutions.

## A POWERFUL SOLUTION FOR MANAGEABLE SCALABILITY

Red Hat Ceph Storage on QCT servers provides effective open source storage software. Standard hardware components maintain low costs, while QCT's innovative development model enables more rapid iteration on a family of server designs optimized for different Ceph workloads.

Red Hat Ceph Storage significantly lowers the cost of enterprise data storage and helps enterprises manage exponential data growth as a robust, massively scalable platform for enterprises deploying public or private clouds. Red Hat Ceph Storage offers mature interfaces for block and object storage—ideal for archival, rich media, and OpenStack or other cloud infrastructure workloads. With self-healing and self-managing capabilities—and with no single point of failure—Red Hat Ceph Storage handles data management so businesses can focus on improving application availability.

As a leader in hyperscale datacenter technology, QCT is now expanding to software-defined infrastructure for efficient, powerful private and hybrid cloud development with QCT's hardware portfolio. QCT offers a full portfolio of datacenter products and services, including engineering, configuration, manufacturing, system and rack integration, performance optimization, and global supply chain support through the QCT global network.

Unlike scale-up storage solutions, Red Hat Ceph Storage on QCT servers lets organizations scale out to thousands of nodes and scale storage performance and capacity independently, depending on application needs and storage server platform.

<sup>1</sup> IDC Worldwide Quarterly Disk Storage Systems Tracker, June 5, 2015

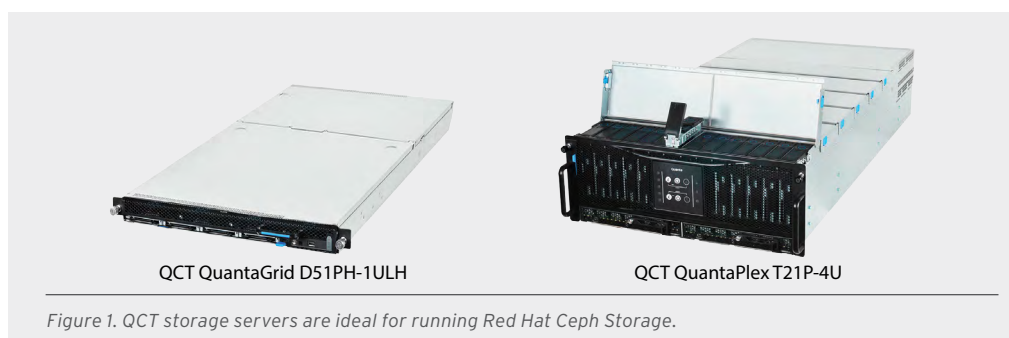
Each 2U server in a dual-mode QCT QuantaPlex T21P-4U server features up to 35 3.5-inch HDDs—offering up to three times the storage density compared with typical 2U servers equipped with only 12 HDDs.

## SEAMLESS INTEROPERABILITY WITH QCT SERVERS AND RED HAT CEPH STORAGE

The combination of Red Hat Ceph Storage and QCT servers delivers seamless interoperability, capital and operational efficiency, and powerful performance.

QCT servers are offered in a range of configurations to allow optimization for diverse application workloads. Servers range from dense, single rack unit (1U) systems to models providing massive storage capacity using only four rack units. Servers enable Ceph journaling by providing expansion slots for PCIe solid-state drives (SSDs) or specially designed spaces for SSDs. As shown in Figure 1, two QCT servers are optimized for Ceph workloads:

- **QCT QuantaGrid D51PH-1ULH server.** With an ideal compact design for smaller Ceph clusters, the QCT QuantaGrid D51PH-1ULH is delivered in an ultra-dense 1U package, with 12 hot-swappable disk drives and four hot-swappable solid-state drives. The four SSDs are supported in a compact 1U chassis, without sacrificing space for 12 disk drives. The D51PH-1ULH server provides both extreme storage density and computing power to accelerate multiple types of workloads. Its innovative hot-swappable drive design means no external cable management arm is required—significantly reducing system deployment and rack assembly time. As a result, IT administrators can service drives with minimal effort or downtime.
- **QCT QuantaPlex T21P-4U server.** Capable of delivering up to 620TB of storage in just one system, the QuantaPlex T21P-4U efficiently serves the most demanding cloud storage environments. The server maximizes storage density to meet the demand for growing storage capacity in hyperscale datacenters. Two models are available: a single storage node can be equipped with 78 hard disk drives (HDDs) to achieve ultra-dense capacity and low cost per gigabyte, or the system can be configured as two individual nodes, each with 35 HDDs to optimize rack density. The T21P-4U server features a unique, innovative screw-less hard drive carrier design to let operators to rapidly complete system assembly, significantly reducing deployment and service time.



Red Hat and QCT architects have conducted extensive Ceph testing on both throughput-optimized and cost- or capacity-optimized configurations for these two QCT servers.

Table 1 illustrates different workload-optimized configurations, with usable storage capacities ranging from 100TB to 2PB. The addition of SSDs provides benefits to throughput-optimized configurations, while they are omitted for cost- or capacity-optimized configurations. Different combinations of network adapters are configured as well, with either single or dual 10 Gigabit Ethernet interfaces or a single 40 Gigabit Ethernet interface configured on each server node.

*“Unlike other partnerships supported only by joint marketing, Red Hat and QCT have invested heavily in lab validation of their combined solutions.”*

—BRENT COMPTON  
DIRECTOR, STORAGE SOLUTIONS,  
RED HAT

**TABLE 1. WORKLOAD-OPTIMIZED CONFIGURATIONS ON QCT SERVERS.**

	<b>EXTRA SMALL (100TB*)</b>	<b>SMALL (500TB*)</b>	<b>MEDIUM (&gt;1PB*)</b>	<b>LARGE (&gt;2PB*)</b>
IOPS-optimized	Future direction	Future direction	Future direction	NA
Throughput optimized**	7x QuantaGrid D51PH-1ULH • 7U • 12x 4TB HDDs • 3x SSDs • 2x 10 Gigabit Ethernet	32x QuantaGrid D51PH-1ULH • 32U • 12x 4TB HDDs • 3x SSDs • 2x 10 Gigabit Ethernet	11x QuantaPlex T21P-4U/dual • 44U • 2x 35x 4TB HDDs • 2x 2x PCIe SSDs • 2x 1x 40 Gigabit Ethernet	22x QuantaPlex T21P-4U/dual • 88U • 2x 35x 4TB HDDs • 2x 2x PCIe SSDs • 2x 1x 40 Gigabit Ethernet
Cost or capacity-optimized**	NA	7x QuantaGrid D51PH-1ULH • 7U • 12x 8TB HDDs • 0x SSDs • 2x 10 Gigabit Ethernet	4x QuantaPlex T21P-4U/dual • 16U • 2x 35x 8TB HDDs • 0x SSDs • 2x 2x 10 Gigabit Ethernet	7x QuantaPlex T21P-4U/mono • 28U • 78x 8TB HDDs • 0x SSDs • 2x 10 Gigabit Ethernet

\* Usable storage capacity

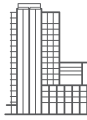
\*\* 3x replicated pools for throughput-optimized block or object storage

\*\*\* Erasure-coded pools for cost- or capacity-optimized object storage

**VALIDATED RESULTS**

Testing of joint Red Hat and QCT configurations was conducted using multiple tools, including the Ceph Benchmark Tool (CBT). CBT testing used the RADOS bench load test utility—a standard part of Red Hat Ceph Storage—and industry standard FIO—block-level RADOS Block Device (RBD)—to measure sequential throughput performance and latency. Random IOPS (input/output operations per second) performance testing is planned.

RADOS bench results on 12-bay QCT QuantaGrid D51PH-1ULH servers demonstrated that cluster throughput scales linearly for sequential reads and writes, as the number of QCT storage nodes is increased (Figure 2). This capability lets organizations predictably scale storage simply by adding QCT servers running Red Hat Ceph Storage.



## ABOUT RED HAT

Red Hat is the world's leading provider of open source solutions, using a community-powered approach to provide reliable and high-performing cloud, virtualization, storage, Linux, and middleware technologies. Red Hat also offers award-winning support, training, and consulting services. Red Hat is an S&P company with more than 80 offices spanning the globe, empowering its customers' businesses.

NORTH AMERICA  
1 888 REDHAT1

EUROPE, MIDDLE EAST,  
AND AFRICA  
00800 7334 2835  
europe@redhat.com

ASIA PACIFIC  
+65 6490 4200  
apac@redhat.com

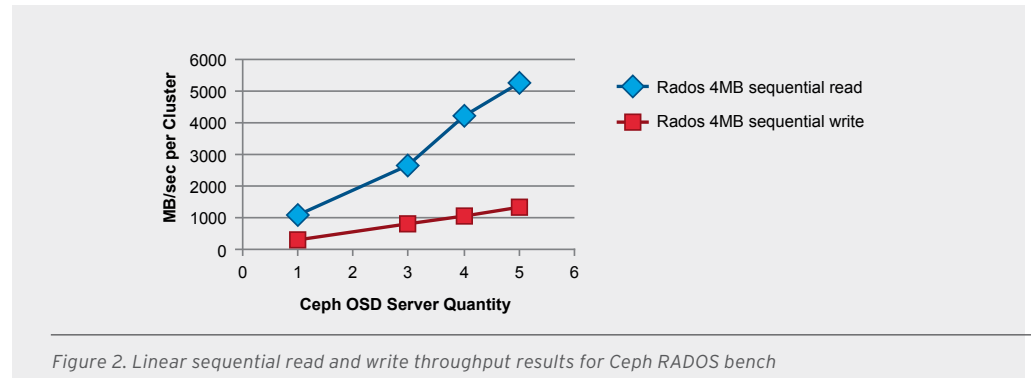
LATIN AMERICA  
+54 11 4329 7300  
info-latam@redhat.com



facebook.com/redhatinc  
@redhatnews  
linkedin.com/company/red-hat

Copyright © 2015 Red Hat, Inc. Red Hat, Red Hat Enterprise Linux, the Shadowman logo, and JBoss are trademarks of Red Hat, Inc., registered in the U.S. and other countries. Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries.

redhat.com  
#INC0315604\_1015



Testing revealed that QCT servers provide multiple benefits for organizations deploying Ceph clusters, including:

- **Cost-effective price per terabyte.** For object archive workloads, QCT QuantaPlex T21P-4U servers with Ceph erasure-coded pools provide competitively priced storage.
- **Flexibility.** For throughput-oriented workloads, both QCT QuantaGrid D51PH-1ULH and QuantaPlex T21P-4U servers with Ceph replicated pools enable organizations to use a range of different cluster sizes.
- **Scalability.** For high-throughput workloads, QCT QuantaPlex T21P-4U servers with Mellanox ConnectX-3 Pro 40 Gigabit Ethernet NICs (network interface controllers) provide scalable throughput and competitive rack-density.

For detailed results and more in-depth information on Red Hat and QCT performance testing, see the Red Hat Ceph Storage and QCT Server reference architecture.

## CONCLUSION

QCT and Red Hat have tested, evaluated, and documented reference architectures that depict real-world scenarios to lower the risk of deploying software-defined storage. With proven reference architectures, organizations can deploy Red Hat Ceph Storage without time-consuming experimentation. Together, Red Hat Ceph Storage and QCT servers provide software-defined storage that can be easily configured to run either throughput-optimized or cost/capacity-optimized workloads. Organizations meet business needs by customizing Ceph deployments to support a range of cluster sizes, from hundreds of terabytes to multiple petabytes.

## ABOUT QCT (QUANTA CLOUD TECHNOLOGY)

QCT (Quanta Cloud Technology) is a global datacenter solution provider extending the power of hyperscale datacenter design in standard and open SKUs to all datacenter customers. Product lines include servers, storage, network switches, integrated rack systems and cloud solutions, all delivering hyperscale efficiency, scalability, reliability, manageability, serviceability and optimized performance for each workload. QCT offers a full spectrum of datacenter products and services from engineering, integration and optimization to global supply chain support, all under one roof. The parent of QCT is Quanta Computer Inc., a Fortune Global 500 technology engineering and manufacturing company. [www.qct.io](http://www.qct.io)